

7. *Leptodactylus gracilis* (D. & B.).*Cystignathus gracilis*, Hens.8. *Leptodactylus mystacinus* (Burm.).*Cystignathus mystaceus*, Hens.9. *Leptodactylus ocellatus* (L.).*Cystignathus ocellatus*, Hens.10. *Bufo arenarum*, Hens11. *Bufo marinus* (L.).*Bufo agua*, Hens.12. *Bufo crucifer*, Wied.*Bufo dorsalis*, *ornatus*, *melanotis*, Hens.13. *Bufo D'Orbigny*, D. & B.14. *Hyla faber*, Wied.*Hyla maxima*, Hens. nec Laur.\*15. *Hyla pulchella*, D. & B.16. *Hyla bracteator*, Hens.

In concluding, I must observe that this list is by no means complete, as Dr. v. Ihering informs me that he has not sent specimens of all the species found by him.

XVIII.—*Descriptions of Sponges from the Neighbourhood of Port Phillip Heads, South Australia, continued.* By H. J. CARTER, F.R.S. &c.

I BEGAN the description of Mr. Wilson's Sponges from South Australia, in the last number of the 'Annals,' with certain species which, during a hasty examination of the whole, seemed to demand more immediate notice than the rest; hence they are mixed up indiscriminately as regards classification. But now I intend to go on regularly with the remainder, according to my proposed arrangement in the 'Annals' of 1875 (vol. xvi. p. 128 &c.), beginning with the first order, viz. the

## Order I. CARNOSA.

There are only two species of this order in Mr. Wilson's collection, viz. a *Halisarca*, which is new, and a single specimen of *Chondrilla nucula*, Sdt.; but of the former species there are several specimens, which will be named and described as follows:—

Fam. 1. *Halisarcida*.*Halisarca australiensis*, n. sp.

Thin and spreading, or contracted, sessile and massive. Consistence soft, elastic, and tough, but yielding like dough to the slightest pressure. Colour cream or pinkish yellow. Surface even, smooth, covered uniformly with a meshed fibro-reticulation, which contrasts strongly by its whiteness with the darker colour of the interstices, but is sometimes in the opposite condition, and sometimes so delicate as to be only seen well under the microscope, if even then. Pores in the interstices of the reticulation. Vents sparse, projecting here and there. Parenchyma consisting of a fibrous reticulation connected with that on the surface, which thus dips down into the interior, holding together the ampullaceous sacs (Geisselkammern); the whole traversed by the branches of the excretory canal-systems. Fibre throughout consisting of delicate transparent filaments twisted together rope-like. Size variable. Largest *spreading* specimen about 2 in. in diameter by 1-8th in. in its greatest thickness, thinning towards the advancing circumference; largest *massive* specimen, which is subglobular with crevices on the surface, about 3-4ths in. each way.

*Hab.* Marine. Apparently extending itself over everything with which it comes in contact.

*Loc.* Port Phillip Heads, South Australia. Depth 20 fath.

*Obs.* As this species becomes hard by contraction in alcohol, so in pure water it becomes flaccid, hence the specimens vary in size a little when subjected to these conditions respectively. The most striking part about it is the fibro-reticulated structure of the surface, which, when well developed, is very beautiful. It appears to be particularly prone to extend itself over a species of *Boltenia* (stalked Ascidian).

*Boltenia australiensis* (provisional).

There are three or more specimens of this *Boltenia* in the collection, together with a sessile Ascidian of the common stalkless form, all covered with a layer of this *Halisarca*, about 1-24th in. in thickness; but there is only one *Boltenia* in which the stem is perfect, and here it is 17 in. long with a diameter of 7-24ths in. where it joins the head, and one of 1-4th in. below, where it ends in a root-like expansion; while the head, which is nodosely tubercular all over except towards the lower part, is 3 in. high by  $2 \times \frac{1}{4}$  in. in its greatest dimensions; and yet the whole, from top to bottom, is covered by a layer of the *Halisarca*. Both

the head and stem are composed of firm whitish cartilage, and the nodosely tuberculated surface of the former covered by the *Halisarca* tends greatly to obscure the position of the openings of the Ascidian. Internally the head is smooth, corresponding with the form of the Ascidian which it contains, so all the rest must be viewed as the test, connected only with the Ascidian itself by vascular extension from the latter, which *here* most strikingly manifests its presence by two large vessels (? artery and vein) which, side by side, longitudinally and centrally extend throughout the stem. But the most remarkable part of the stem is that, being almost entirely composed of the white or colourless cartilage, it has imbedded in its structure a thin cylindrical layer of reticulated, anastomosing, keratose, solid, laminated, amber-coloured fibre, so similar to that of a keratose sponge, that, if the two were placed together, it would be almost impossible to distinguish between them. This is situated just inside the circumference of the stem in the midst of the white cartilage, where, by its amber-yellow colour, it contrasts strongly with the latter. It extends from one end to the other of the stem, to which it appears to be confined, disappearing equally towards the head and in the branches of the root-like expansion. Nowhere does the presence of the *Halisarca* appear to influence the form of the test, which is as smooth over the nodosely tuberculated head as it is over the even surface of the cylindrical stem. How far the Ascidian itself may be identified with Prof. Herdman's *Boltenia pachydermatina* ('Challenger' Reports, pt. xvii. p. 89) I am not prepared to say; but as I find specimens of *both* in Mr. Wilson's collection, I can with confidence state that there is considerable difference between the forms of the tests and the composition of their stems generally. That which corresponds to the description of *Boltenia pachydermatina* is not covered with *Halisarca*, while the smooth, wrinkled, and horn-like corrugated stem presents no keratose fibre, but is charged with little calcareous spicules extending inwards for about 1-180th in.; inside which the cartilage and the two longitudinal vessels are the same as in my *Boltenia australiensis*. In general form, composition, and appearance the spicule is like that of the Alcyonaria, while it more particularly resembles that from the stem of *Boltenia reniformis*, as represented by the late Prof. Quekett ('Lectures on Histology,' 1852, p. 264, fig. 148); that is, consisting in its most perfect state of a short thick shaft, terminated at each end by a rosette of five globular tubercles arranged quincuncially, the whole about 8 by 7-6000ths in. in greatest dimensions.

*Synascidia bolteniformis* (provisional).

Besides the above there is another *Boltenia*-shaped specimen in the collection, of much the same size as the foregoing, but unfortunately imperfect, as the upper part of the head appears to have been cut off and only a few inches of the stem remain. Resemblance in form here, however, goes for nothing, for the whole consists of a stalked cormus of a *compound tunicated Ascidian*, in which the head is paved over with a layer of Synascidians. That part of the head which remains is not tuberculated, but unequally quadrilateral, oblong and smooth, about 2 in. high by 1 in. in horizontal diameter, after which follows a round and also smooth portion (like in shape to that of *Boltenia australiensis*), which becomes contracted towards its union with the stem, where it is half an inch in diameter; that which remains of the stem, which is cylindrical and corrugated transversely, being  $4\frac{1}{2}$  in. long by  $\frac{1}{4}$  in. in diameter at the end, where it has been broken off from apparently a similar continuation. While, however, the head *alone* is covered with a tough, transparent, colourless membrane beset with little circular spaces, through the centre of each of which the branchial aperture of the Synascidian slightly projects; the intervening portion between the head and the stem itself, together with the latter, is incrustated with sand, which is imbedded in the subcartilaginous tissue of which it is composed, to the extent of about 1-24th in., within which again this tissue is longitudinally traversed by a number of tubes which in a transverse section resembles that of monocotyledonous wood. The Synascidians which cover the head or corne are irregularly disposed in juxtaposition, and not in colonies or groups; nor could I see any common openings or cloacæ among them; while the interior of the head, which is composed of a solid mass of subcartilaginous, translucent tissue, is apparently more or less charged with ova. But all further investigation of this species I must leave to others, if it has not before been described, as my object here is only to point out that such a specimen exists in Mr. Wilson's collection.

Since the above was written, the ship 'Sarah Grice,' to which I have alluded (*antea*, p. 108), has arrived, and the "consignment" therein mentioned has safely reached me, wherein I find, among numbers of other interesting specimens, several of which are new, still another bolteniform specimen of a Synascidian, which may be named and described as follows:—

*Synascidia cauliculata*, ? n. sp.

Cormus or head obversely conical, flower-pot shaped, somewhat compressed now; gelatinous flaccid, semitranslucent, surfaced by sixteen or more ridges, each about 1-12th in. in its broadest or upper part, which extend upwards from the contracted or fixed end, more or less parallelly, to the free margin of the cormus, over which they bend inwards towards the centre, which is rather depressed; each ridge bearing a double row of synascidians, one on each side, increasing in size upwards as they become more and more developed, until they reach the upper part of the head where this is completed. Colour that of grey semitransparent gelatine, cuticled. Head about  $1\frac{1}{4}$  in. high and 1 in. its broadest diameter, that is at the free or upper margin. Stem round, corrugated transversely, smooth, leathery, of a yellowish shining colour, decreasing gradually in size from its union with the cormus to its lower extremity, which is terminated by a root-like expansion; composed of a tough, yellow, smooth cuticle circumferentially, followed by a thin layer of granular cells: the rest made up of double circular cells or holes, like the figure "8," separated by a thin septum, each cell about 1-300th in. in diameter, imbedded in granuliferous gelatinous cartilage. Stem 6 in. long, by 1-6th in. in diameter, close to the cormus, and 1-24th in. at the other end. Synascidian not examined further than was sufficient to determine the nature of the object.

*Hab.* Marine.

*Loc.* Port Phillip Heads, South Australia.

## Fam. 2. Gumminida.

The specimen of *Chondrilla nucula*, to which I have alluded, is subglobular, lobate, about  $\frac{3}{4}$  in. high and 2 in. in horizontal diameter now in its spirit-preserved state; if dried this would be considerably less. When fresh the colour was much the same as it is now, viz. "dark grey, nearly black." In short, it is precisely the same as the Adriatic species first described by Schmidt, which I find to be world-wide in distribution.

It may be remembered here that I have already described and illustrated a species of *Chondrilla* of a buff-colour from Port Jackson, under the name of *C. australiensis* ('Annals,' 1873, vol. xii. p. 23, pl. i. figs. 10-15). In appearance and colour, besides growing over all bodies with which it comes in contact, this much resembles *Halisarca australiensis*, but here again the resemblance ceases, for *Chondrilla australiensis* is *corticate* and possesses spicules; while *C. australiensis*

not only differs from *C. nucula*, Sdt., in colour, but slightly in spiculation also, as the *genuine* specimen of *C. nucula*, Sdt., above mentioned in Mr. Wilson's collection well demonstrates.

## Order II. CERATINA.

### Fam. 1. Luffarida.

There are three specimens of *Luffaria* in Mr. Wilson's collection, of which two are simply digitate and branched, and the other palmodigitate, but all of the same species, which, being new, may be named and described as follows:—

#### *Luffaria digitata*, n. sp.

Specimen digitate, branched, rising from a short single stem; digitations solid, simple, cylindrical, long, and branched, or expanded palmately at first, and then subdivided irregularly into smaller branches of unequal size and length afterwards. Consistence loose, soft, in the spirit-preserved specimen. Colour, when fresh, "enamel pink," now pinkish grey. Surface cactiform, consisting of long conuli about  $\frac{1}{4}$  in. apart, each terminated by a single or bifurcated filament of the skeletal fibre, which makes them look still longer, held together by an intervening thick, well-marked fibro-reticulated dermis, in which the fibrous part is fleshy and soft, and the whole devoid of any foreign material. Pores in the interstices of the reticulation. Vents here and there chiefly situated on projecting processes. Fibrous structure of the interior loose, widely reticulated; fibre itself composed of a stout cylinder of dark amber-coloured keratine, cored or axiated, as usual, with a grey granulo-flocculent substance; core *less* in diameter than the thickness of the keratose wall, producing a corresponding wide and loose parenchyma, of which the sarcoidic laminae tympanizing the interstices of the fibro-reticulation are thick, fleshy, soft, and traversed by a reticulation of soft fibre like the dermis. Size of specimen 9 in. high by  $4 \times 2$  horizontally. Palmate expansion of the largest branch 2 in. broad by  $\frac{1}{4}$  in. thick, shrinking from its loose open structure to a comparatively insignificant size when dried.

*Hab.* Marine.

*Loc.* Port Phillip Heads, South Australia. Depth 20 fath.

*Obs.* The comparative absence of lateral fibre here, the smallness of the core compared with the thickness of the keratose wall of the fibre generally, the coarse open fibrous reticulation of the skeleton, and the red fleshy sarcode characterize

this species. To say that it never goes beyond the size or consistence mentioned would be premature, since there are many skeletal specimens of this family from Australia in the British Museum which far exceed these in dimensions as well as in compactness of structure. Then it should be remembered that the older the growing specimen is, the thicker the fibre, which, of course, is especially seen at the base. Thus in two small specimens (? of a new species), received from the same source, since the above was written, each about 4 in. long, one of which is club-shaped and the other bifurcated, the fibre commences in a thick, round, furrowed, skeletal stem about 1-12th in. in diameter, which throws out buds from its surface and ultimately branches into a dendritic form to support the sarcode of the head, which is of a brown colour. Why the colour should be brown in one specimen of the same species and red in another, while the soft fleshy fibro-reticulation of the dermis is equally charged with ?-pigmental cells in all, I am ignorant.

## Fam. 2. Aplysinida.

### *Darwinella australiensis*, n. sp.

Massive, sessile, lobate; lobes simply convex, or compressed and elongated horizontally into meandriniform, thick, erect, and branching ridges. Consistence soft, resilient. Colour, when fresh, "venetian red," now dark grey flesh-colour. Surface conulated, conuli about 1-8th in. apart, terminated respectively by a single filament or fibre, which gives a hairy appearance to the whole, supported in the interval by a beautifully soft and fleshy fibro-reticulated dermis charged abundantly with triradiate *keratose* spicules, whose rays intercross and lie parallel to each other respectively, so as to leave interstices in which the pores are situated. Vents numerous on the prominent parts of the convex lobes and along the ridges of the compressed ones. Fibrous structure loose, widely reticulated; main or vertical branches composed of a thin cylindrical wall of dark amber-coloured keratine, cored, as usual, with a light grey granulo-flocculent substance, but with the "core" *much greater* in diameter than the thickness of the keratose wall, so that the fibre collapses on desiccation, which is the opposite to that which obtains in the Luffarida; hence this is the chief distinction. Lateral or small fibre very scanty, its place being supplied by the triradiate keratose spicules with which the parenchyma is as much supplied as the dermis; the whole traversed by the branches of the excretory canal-systems which terminate re-

spectively in the vents mentioned. Triradiate, keratose spicule, whose angles are equal and arms about 85-1800ths in. long by 4-1800ths in. wide at the base, cored throughout by a canal which is formed of conical layers of keratine given off successively from a granuliferous cell in the centre, diminishing in size with the diameter of the ray, generally presenting the commencement of a fourth ray in the centre in the form of a minute tubercle, which is a *bud* of the central cell, and, although most frequently of microscopic size, is sometimes fully developed, thus causing the spicule to become quadriradiate; while, on the other hand, sometimes only two rays are developed from the central cell, viz. in opposite directions, which gives it the so-called "monactinellid" or acerate form. Size of the largest specimen, of which there are several and all comparatively small, about 2 in. high by 2 x 2 in. horizontally.

*Hab.* Marine.

*Loc.* Port Phillip Heads, South Australia. Depth 19 fath.

*Obs.* This undoubtedly is a *Darwinella*, like the species from the N.W. coast of Spain, which, ignorant at the time of Fritz Müller's discovery, I described and illustrated under the name of "*Aplysina corneostellata*" ('Annals,' 1872, vol. x. p. 105, pl. vii.). The Australian species chiefly differs from the others in the prevailing number of the rays being *three* instead of four or more.

I must observe here, however, that, although I have alluded in the 'Annals' of 1881 (vol. viii. p. 118) to the observations of Fritz Müller, who first described and illustrated *Darwinella* from a specimen found on the shore of Desterro, in Brazil (Archiv f. mikroskop. Anat. Bd. i. S. 344), chiefly for the purpose of opposing his and Oscar Schmidt's theory, that the evolutionary development of the *mineralized* spicule was preceded by the simple keratose form, yet I must admit that, in the examination of the Australian species, the keratose stellates or triradiates, in their great abundance and arrangement, especially on the surface, together with their origin respectively in a *single central cell* (the "horn-cell," as I have heretofore termed it), so closely resemble the tri- and quadriradiates of a Calcsponge in these particulars that, however much we may be inclined to question the validity of Fritz Müller's theory, these spicules, while they appear to supply the place of the "lateral fibre" in *Darwinella*, not only assume the office of the tri- and quadriradiates in the Calcsponges, but in size too are about the same as the large tri- and quadriradiates of our British *Leuconia Johnstonii*.



*Aplysina laevis*, n. sp.

Specimen smooth, solid, cylindrical, curved, compressed; in form something like the free end of a large black leguminous pod; free end round, the other truncated or broken off, as if it were the upper portion of a much longer curve. Consistence hard. Colour dark black-purple outside, lighter within. Surface smooth, covered with a thick almost leathery dermis charged with sand or foreign microscopic objects; without conuli saving a slight trace of obtuse elevations, becoming corrugated when dry. Pores scattered plentifully over the surface, but closed by contraction, and therefore not easily distinguished. Vents also not seen, from the same cause probably. Fibre stout but scanty, composed of dark amber-coloured keratine cored with the usual grey granulo-flocculent substance, which, on shrinking under desiccation, leaves a hollowness; but the fibre itself, from its thickness, does not collapse. Sarcode of the parenchyma inspissate, densely charged with foreign microscopic objects like the dermis, traversed by the branches of the excretory canal-systems, which, participating, probably, in the general contractile nature of the soft parts, present a small appearance. Size of specimen  $3\frac{1}{2}$  in. high by  $2 \times 1\frac{1}{2}$  in. horizontally.

*Hab.* Marine.

*Loc.* Port Phillip Heads, South Australia. Depth?

*Obs.* The most striking point about this species of *Aplysina* is its smooth surface and leathery dark dermis, being without conuli and any projecting filaments of the fibro-skeletal structure; after which, and perhaps not less remarkable, is the large amount of foreign microscopic material with which the species is charged; and, lastly, its form, although this may differ in other specimens. The fibre does not collapse on drying, on account of the keratose cylinder being so thick, which, of course, lessens the diameter of the core, and thus makes it as much like the fibre of a *Luffaria* as that of an *Aplysina*, which, in other respects, its characters most resemble, and hence its name and location. Liq. potassæ at first heightens, and then dissolves out the colouring-matter.

## Fam. 3. Pseudoceratida.

*Pseudoceratina durissima*, n. sp.

Massive, sessile, lobed, somewhat compressed. Consistence solid, intensely hard. Colour, when fresh, "blue-black," now black-mulberry. Surface uneven but smooth, consisting of a thin, hard, compact fibrillous dermis spread over low

conular elevations of the subjacent tissue, with an indistinct reticulation between them; fibrillæ of the dermis colourless, plentifully accompanied by minute dark pigmental cells. Pores in the interstices of the dermal reticulation now (probably from contraction) only discernible under the microscope. Vents scattered over the surface, but small, probably from the same cause. Parenchyma chiefly composed of fibrillose sarcode structurally blended with the fibrillæ of the dermis, but, from the comparative absence of pigmental cells, much lighter in colour; charged more or less with grains of sand and other foreign microscopic objects, which, in some parts, are surrounded by layers of amber-coloured keratine, so as to form unconnected and ill-defined short fragments or traces of genuine fibre, which is otherwise absent. Size of specimen 2 in. high by 4 × 2 in. horizontally at the base.

*Hab.* Marine.

*Loc.* Port Phillip Heads, South Australia. Depth 19 fath.

*Obs.* The dark purple colour of the surface with the subconular elevations, together with the fragmentary character of genuine fibre produced here and there by the development of keratine laminae round some of the foreign objects of the interior, appear to me to ally this remarkable sponge to the third family of the Ceratina more than to any other group; while its intense wood-like hardness and the fact that, when cut into, the interior is yellow, but rapidly changes before the eye to green and lastly lead-colour or grey, after the manner of the poisonous *Boletus*, viz. *B. luridus*, are peculiarities which cannot fail to point out the species.

Moreover, I now find, from having such a well-preserved and large specimen to deal with, that the small dried fragment from Australia that I described and represented with the Trincomalee species under the name of *Aplysina purpurea* ('Annals,' 1881, vol. viii. pp. 103, 104, pl. ix. fig. 2, a, b, c), should not have been included under this name, but, being identical with that in Mr. Wilson's collection, should, on the contrary, be considered as a specimen of *Pseudoceratina durissima*.

*Pseudoceratina crateriformis* (provisional).

Massive, sessile, wide, conical, wrinkle-ridged, truncated at the summit by the opening of a large cloacal crateriform vent. Consistence resilient. Colour, when fresh, "greenish grey;" the same now. Surface deeply wrinkled with high ridges more or less interunited by ramification; the whole covered with a sandy incrustation in the form of a minutely reticulated or sieve-like structure, whose interstices are tym-

panized by the dermal membrane. Pores in the interstices of the retiform incrustation. Vent single on the summit, large and circular, about  $\frac{3}{4}$  in. in diameter at the orifice, contracted inwardly by a thick, sarcodic, fleshy fold of the dermal membrane. Main fibre cored with foreign microscopic objects, sand, &c.; lateral or interuniting fibre cored only with the grey flocculent substance, the former *psammonematous*, the latter *luffarid*, both enclosed within the same kind of amber-coloured keratine. Sarcode of the interior thick and inspissate, scantily charged with foreign material; grey in colour, supported by the fibre just described, and traversed by the branches of the excretory canal-system, which open into a general or cloacal cavity terminating in the vent at the summit. Size of specimen  $2\frac{1}{2}$  in. high by  $2\frac{1}{2}$  in. in diameter at the base, which is circular.

*Hab.* Marine.

*Loc.* Port Phillip Heads, South Australia. Depth?

*Obs.* While the presence of the luffarid "interuniting fibre" seems to ally this species to the Ceratina, the large wrinkled surface covered with the reticulated or cribriform incrustation, the single large terminal vent preceded by the cloaciform interior, and the fleshy character of the sarcode about the vent, equally ally it to *Halispongia choanoides*, Bk., = *Stelospongos*, Sdt., and especially to the "wrinkled" surface of that specimen represented and described by Dr. Bowerbank in the 'Proceedings of the Zoological Society' for 1872 (p. 123, pl. vi.) under the name mentioned. Hence my generic appellation should be considered "provisional."

As the "granulo-flocculent grey substance" which characterizes the core of the fibre in the Ceratina appears to me to be the same as that within the keratose cell ("horn-cell"), and may often be seen mixed up with the foreign objects which form the core of the fibre in the Psammonemata, it seems to me not improbable that this is the substance which first of all brings the foreign material into *line* for the formation of the fibre in the latter; and that, failing to do this, the "granulo-flocculent substance" alone remains, which leads to the production of the *genuine* fibre of the Ceratina; while this failure taking place *partially*, may produce the mixture which is characteristic of that family of the Ceratina for which I have proposed the name of "Pseudoceratida."

### Order III. PSAMMONEMATA.

As an examination of Mr. Wilson's specimens has suggested to me much that indicates a necessary revision of this order, and I find that it can be done best by beginning with

the lowest forms and building upwards, instead of following the arrangement given in my classification, which is the reverse, I shall pursue this course after having premised the following introductory remarks:—

It is desirable, when about to introduce anything new, to state such generalities as may not only facilitate its understanding, but, if possible, curtail length of description, in order that the student may of himself be able to supply the former, which otherwise might become tedious repetition in the latter.

Twenty-six years have passed since my observations on the growth of the young *Spongilla* from the statoblast were published, and although much has been done since in structural description, yet a key to a great part of this might be found in my illustration of a minute but entire specimen of *Spongilla*, whose component parts were then drawn to the same scale, "in order that their relative proportions might be preserved as much as possible" for diagrammatic purposes in teaching; but I question if such use was ever made of it ('Annals,' 1857, vol. xx. pl. i. fig. 1).

In this figure, it may be observed that the parenchyma, of which the body of the sponge is composed, is surrounded by a dermal membrane, which is kept at a certain distance off by the projection of conical bundles of spicules issuing from the parenchyma, thus leaving a hollow between the two, subsequently termed by Dr. Bowerbank the "subdermal cavity."

This "dermal membrane," or cuticle, I named at the time "investing membrane," and the *interval* between it and the parenchyma the "cavity" of the "investing membrane." I also then stated that the "investing membrane" was pierced by "apertures" or pores (*ib.* p. 22), and that the parenchyma was traversed throughout by the branches of the excretory canal-system, which ended in a single tubular vent that passed directly through the cavity of the investing membrane (*l. c.* pl. i. fig. 1, *g*), to terminate a little distance beyond the latter, with which it was intimately connected at the point of its passage, so that the contents of the excretory canal-system could not get into the cavity of the investing membrane. Thus all the *main features* of sponge-structure were foreshadowed.

Now it is evident, as shown in the figure to which I have alluded, that if the "investing membrane" should sink *in towards* the parenchyma by collapse or otherwise, the points of the bundles of spicules which support it would become conical, and hence the features thus produced have been termed

the "conuli," while the space between the conuli would be more or less occupied by the "apertures" or pores. Still the conuli are by no means present on all sponges, and they are especially absent on the slippery surfaces of the Carnosa, while they are perhaps most typically developed on some of the Psammonemata; but the former is the exception.

Again, they are of course subject to variety in *composition*, being spiculiferous in the spiculiferous sponges, simply keratose in the Ceratina, and areniferous in the Psammonemata. Also subject to variety in *form*, since they may consist of a simple point, and this may be single or grouped; or obtusely pointed singly or *en groupe*; or by extension in line and uniting with one another form a reticulation which may be more or less general; but in all cases the points are originally covered by the dermal sarcode, that is, in their natural state, although often naked and protruding afterwards.

It is necessary to be prepared for all these modifications, or the same thing may be described indefinitely under different names.

The same may be said of the "investing" or dermal membrane itself, which in the spiculiferous sponges may or may not be charged with spicules (chiefly the minute or flesh-spicules) which are more or less arranged in a reticulated form, so that the pores may be in the interstices; or it may be traversed by a soft fleshy fibrous reticulation, as in the Ceratina; or charged with foreign microscopic bodies (sand, fragments of sponge-spicules, &c.), as is often the case in the Psammonemata, where they may assume a similar form; but in all instances the reticulation may become so thickened as to obliterate the interstices and so pass into a simple incrustation, wherein, however, holes for the pores are always preserved, because these are essential to the existence of the sponge.

As regards the mineral element, this may be produced by the sponge itself or borrowed from the exterior; the former is the case with the spiculiferous sponges and the latter with the psammiferous ones. Of course in the spiculiferous sponges the spicules, which have been termed "proper," are all of one or more forms and all *entire*; whereas in the borrowed material, which has been termed "foreign," they are generally of many kinds and mostly fragmentary, more or less mixed up with other microscopic objects, such as grains of sand &c.; but the predominance of one more than the other will depend upon the prevailing element in the locality where the sponge may be growing. At the same time it cannot be denied that, in some instances, the sponge itself

appears to manifest a power of selection or preference in this respect.

With reference to the development of the keratose fibre in the dermal membrane, it may be observed that this originates chiefly in the conuli which are the growing terminations of the main or vertical fibre of the sponge, from each of which it extends outwards and downwards radiatingly, like the ropes of a tent, so that, as the fibre diminishes in size by branching and subdividing, the subdivisions not only become united between themselves, but meet and become continuous with the like from the neighbouring conuli, whereby an interuniting fibrous reticulation is formed in the dermal sarcode between the conuli, in whose interstices the pores are situated and protected; while the keratose fibre may be cored or not with mineral elements, as already noticed.

Again, what has been stated of the external parts of the sponge applies *cat. par.* to the internal ones or parenchyma; for as the sponge grows by the addition of layers to its circumference, that is radiatingly, so the surface of to-day becomes part of the internal structure of to-morrow, and thus somewhat modified it passes into a cancellated form, which is the parenchyma; that is to say, the fibrous skeleton, cored by mineral material or not, becomes a solid mass of reticulation, in which the interstices are tympanized by the *still* poriferous sarcode (as may be seen in a dried specimen), and the cancellated chambers thus completed. Lastly, the whole is traversed by the branches of the excretory canal-systems. I use the latter in the plural number, because generally every vent indicates a system.

Still another condition arises from the *amount* of keratine developed, which may be entirely absent in the lowest forms of the Psammonemata (for I must confine myself henceforth to this order, as we are now more immediately concerned with it), where the *sarcode* retains its delicate pristine nature; or it may be diffused throughout the sarcode generally, so as to give it a horny consistence, as if the sarcode itself had passed into this state, which is better seen in the *dry* than in the wet specimen, when it presents a light amber colour, while it is all grey together in the wet one; so in the production of fibre the mineral element, that is the foreign objects, may be held together by a mere film of keratine, while on other occasions the investiture of keratine may not only exceed the core of foreign objects in thickness, but assume the consistence and toughness of horn; then as regards colour, the keratine, which is generally yellow and transparent like amber, may in some species be as transparent and colourless as glass.

Lastly the keratose fibre may be generally or partially cored with foreign objects, in which case the vertical fibre is generally the most, and the lateral the least so; but it is a remarkable fact that, throughout the Psammonemata, the arenaceous fibre is frequently so thinly clad with keratine as in many instances to appear to be nothing more than a simple chain of foreign objects. The terms "vertical" and "lateral" are synonymous with Dr. Bowerbank's "primary" and "secondary" fibre.

With these preliminary remarks let us now enter upon the revision of the order Psammonemata after the manner to which I have above alluded, that is beginning with the lowest forms first and working upwards, in which it should be remembered that I am chiefly limited in this respect here to what Mr. Wilson's specimens indicate, as I want to point out, by them too, what is to be found on the south coast of Australia.

After noticing that which I considered to be the *Dysidea Kirkii* of Dr. Bowerbank ('Annals,' 1881, vol. vii. p. 374), a summary was given of what had been stated of this as well as the British species *Dysidea fragilis*, in which was quoted the following passage from Dr. Bowerbank's 'Monograph of the British Spongiadae' (vol. i. p. 212), viz.:—"In our British species, *Dysidea fragilis*, Johnston, the primary fibres are often as abundantly arenated as those of the Australian species (*Dysidea Kirkii*), while the secondary ones are only partially filled with extraneous matter." Thus both species were fibrous, and both the "primary" and "secondary" fibres were arenated, that is contained foreign objects. In short, both species were fibrous and *all* the fibres arenated, although not equally so, which is what I want to insist upon here. Hence I was wrong in stating that *Dysidea fragilis* and *Spongelia pallescens*, Sdt., were the same; for by consulting Schulze's representation (Zeitschrift f. wiss. Zoologie, Bd. xxxii. Taf. vi. fig. 5), which I am able to confirm by having a type specimen of Schmidt's *S. pallescens*, it will be observed that "all" the fibre here is *not* "arenated," but that the lateral or secondary fibre is mostly keratose and homogeneous, *i. e.* clear or not cored with foreign bodies, while the vertical or primary fibre *is completely* cored or arenaceous. My mistake arose from the conulated surface of *Dysidea fragilis* when dried in its *natural* state being precisely like that of *Spongelia pallescens*. Thus Hyatt was right in separating *Dysidea* from *Spongelia*, *i. e.* *S. pallescens* (Mem. Boston Soc. Nat. Hist. 1877, vol. ii. pt. 4, p. 539). Both

*Dysidea fragilis* and *Dysidea Kirkii* therefore are *fibrous*, and all the fibre arenated; while on microscopically examining the fibre itself it will be found to represent the lowest degree of it above mentioned, viz. that in which the fibre is composed of foreign objects held together by the merest minimum or film of keratine, and hence its delicate and fragile nature, from which Johnston's designation "*fragilis*" was derived; but still it is *fibre*.

However, leaving this subject for the present, Mr. Wilson's specimens from the neighbourhood of Port Phillip Heads, South Australia, have brought me acquainted with a still lower form, viz. that in which there is absolutely *no fibre*, but where the foreign material is diffused, and so far held together by being imbedded in the delicate flakes of the parenchymatous sarcode generally; where, traversed by branches of the excretory canal-systems, it thus forms the skeletal or supporting structure of the sponge, and under this condition may assume many different sponge-like forms, which may distinctly vary according to the species or variety, but at the same time are all developed out of the same kind of structure and composition *through the specific agency of the "sponge-sarcode" in which the whole originates and which in all cases throughout the class of Spongida determines both the form and the composition of the sponge.*

For this group I would propose the term "*Holopsamma*," under the following diagnosis, viz. :—

#### HOLOPSAMMA, nov. gen.

*Char.* Arenaceous sponges without fibre, whose composition consists of foreign microscopic objects (sand, fragments of sponge-spicules, &c.) diffused in the flakes of the parenchymatous sarcode; traversed by the canals of the excretory system; assuming a variety of sponge-like forms, perhaps chiefly massive, in which respectively the surface may consist of the pore dermal membrane under any of the forms above mentioned, that is, simple, continuous, and smooth, or rendered more or less uneven and interrupted by the presence and projection of the sandy element above the common level.

##### 1. *Holopsamma crassa*, n. sp.

Form of specimen massive, variable. Consistence hard, heavy, gritty, friable. Colour, when fresh, "bright orange-yellow," now light brown, varying with that of the sand of



which it is composed. Surface more or less uneven, according to the form assumed by the subdermal sand. Pores in the intervals between the dermal projections, wherein the sarcode may or may not be charged with foreign material. Vents numerous and large, chiefly situated on the most projecting parts or ridges, or on the opposite side to that of the pores. Structure coarse from the large size of the grains of sand of which the species is composed. Size variable.

*Hab.* Marine.

*Loc.* Port Phillip Heads, South Australia. Depth variable, under 20 fath.

*Obs.* Examined both in the wet and dried states. The specimens of this species, which are very numerous, vary so much in shape and size that it is hardly possible to give more than the above general description of them, in which the most striking character is the coarseness and grittiness of the sand; hence the designation.

## 2. *Holopsamma laevis*, n. sp.

Specimens very irregular in form, which is massive and more or less variably lobed, spreading horizontally while it rests upon a number of points over which it may be arched, so as to present an upper and a lower surface. Consistence light, gritty, friable. Colour grey externally, orange yellowish or grey internally. Surface even, consisting both above and below of a dermal layer of sarcode more or less charged with foreign objects, which, being principally fragmentary sponge-spicules, give it a white colour when dry. Pores in juxtaposition throughout the dermal layer, but chiefly on the upper surface. Vents numerous and large on the prominent parts, but chiefly on the lower surface. Structure less coarse than that of the foregoing species, and therefore looser and lighter, being generally composed of much smaller grains of sand. Size variable.

*Hab.* Marine.

*Loc.* Port Phillip Heads, South Australia. Depth varying under 20 fath.

*Obs.* Examined both in the wet and dried state. Designated from its comparatively light, not heavy, structure. Of this species also there are several specimens, in most of which the sarcode internally is orange-yellow and more or less charged with ova of the same colour, but much deeper.

## 3. *Holopsamma laminiferosa*, n. sp.

Specimen hemispherical, globular, elongate, sessile or con-

tracted towards the base. Consistence tender, friable, coarse, gritty. Colour dark brown. Surface consisting of the edges of the laminae, often passing into a honeycomb form by transverse interuniting processes. Pores indistinct, on the surface of the laminae. Vents also small, on their margins. Structure columnar, radiating, laminar; laminae thin, undulating, closely applied to each other, like the leaves of a book, or thicker, further apart, and interuniting by transverse processes, producing the honeycomb-like structure. Size variable.

*Hab.* Marine.

*Loc.* Port Phillip Heads. Depth 20 fath. and under.

*Obs.* The globular, elongated, or hemispherical structure radiating laminiferously or in the form of a honeycomb, together with the dark brown colour, characterizes this species, to which may be added another variety, where the laminae are grouped irregularly, irregular on the surface, and irregularly notched or denticulated on the margin: also another form in which the lamina is branched digitato-chalina-like.

#### 4. *Holopsamma fuliginosa*, n. sp.

Form of specimen massive, sessile, contracted at the base, consisting of erect compressed lobes about  $\frac{3}{8}$  in. thick, with irregular margins, more or less united together centrally or proceeding from each other proliferously. Consistence hard, coral-like. Colour dark neutral tint outside, lighter within. Surface smooth, irregularly papillated. Vents and pores not seen, probably closed by desiccation. Structure very compact; texture small-grained. Size of largest specimen, for there are two, 8 in. high by 6 x 5 in. horizontally.

*Hab.* Marine.

*Loc.* Port Phillip Heads, South Australia. Depth?

*Obs.* Examined in the *dry* state only, as there is no spirit-preserved specimen. The remarkably stony, hard, coral-like form and appearance of this species, together with the black colour, renders it almost unmistakable; and, although there are no vents to be seen on the surface, the internal structure is plentifully traversed by the branches of the excretory canal-system.

#### 5. *Holopsamma turbo*, n. sp.

Turbinate, like a peg-top, solid; presenting a circular depression in the centre of the summit, passing into a round attenuated stem below, which terminates in a root-like expansion. Consistence soft, resilient. Colour, when fresh, "terra-cotta red, with a coating of grey," now grey outside

and orange within. Surface smooth, consisting of an areniferous dermis. Pores plentifully scattered all over the dermis. Vent single at the bottom of the depression in the summit. Parenchyma cancellous, areniferous, without fibre. Size of the largest specimen, for there are two,  $3\frac{3}{4}$  in. high by  $1\frac{1}{2} \times 1$  in. in its greatest dimensions.

*Hab.* Marine.

*Loc.* Port Phillip Heads, South Australia. Depth 18 fath.

*Obs.* It is the peculiarity in shape more than anything else which characterizes this species. Mr. Wilson has compared one of the specimens to "a ripe fig." The colour of the sarcode internally is orange-yellow, like that of many specimens of *H. levis*.

#### SARCOCORNEA, nov. gen.

*Char.* The same as that of *Holopsamma*, but with the sarcode inspissated, voluminous, and more or less transformed into keratine, that is, rendered horny.

#### *Sarcocornea nodosa*, n. sp.

Specimen dry, massive, sessile, contracted towards the base, somewhat compressed, lobulated on both sides. Consistence, when dry, extremely hard, chiefly owing to the thickness of the dermal sarcode. Colour dark grey-brown on the surface, lighter internally from the presence of the white particles of foreign material. Surface smooth, even, consisting of the thick glutinous dermal layer. Pores in juxtaposition in the thick dermal membrane, leading down (as seen in the section) by vertical canals into the subdermal cavities. Vents very numerous, marginate, situated all over the crest and on the prominent parts of the lobes of the specimen. Structure internally compact, glutinous; parenchymatous sarcode more or less keratose; charged diffusively with arenaceous foreign material; the whole traversed by the branches of the excretory canal-systems. Size of specimen 5 in. high by  $7\frac{1}{2} \times 3$  in. horizontally in its greatest dimensions.

*Hab.* Marine.

*Loc.* Port Phillip Heads, South Australia. Depth?

*Obs.* There is but one specimen of this kind which has been dried, and therefore the inspissated keratose sarcode hardened by contraction almost into the consistence of dry dark-brown glue, which is the chief character of the species.

It seems desirable for more immediate reference that, before going further, I should insert here the following copy of the

tabular view of my proposed classification of the order Psammonemata, given in the 'Annals' of 1875 (vol. xvi. pp. 188 and 189), in order that the revision suggested by Mr. Wilson's specimens may be the better followed and understood:—

Order.	Families.	Groups.
III. PSAMMONEMATA.	1. <i>Bibulida</i> . . . . .	1. Euspongiosa.
		2. Paraspongiosa.
		3. Hirciniosa.
		4. Callistia.
		5. Penicillata.
		6. Rigida.
		7. Subrigida.
		8. Foliata.
		9. Dactylifera.
	2. <i>Hircinida</i> . . . . .	10. Fenestrata.
		11. Platyfibra.
		12. Peraxiata.
		13. Inerustata.
		14. Otahitica.
		15. Sarcocornea.
		16. Arenosa.
	3. <i>Pseudohircinida</i> . .	17. Pseudoarenosa.
		18. Chalinohircinina.
		19. Armatohircinina.

### Gen. DYSIDEA, Johnston.

*Char. emend.* Fibrous arenaceous sponges, in which the fibre is chiefly composed of foreign microscopic objects (sand, fragmentary sponge-spicules, &c.), held together by a mere film of keratine, supporting the flakes of the parenchymatous sarcode; traversed by the branches of the excretory canal-system; assuming a variety of sponge-like forms, on which the pore-dermis may be continuous and smooth, or rendered more or less uneven and rough by projection of the subjacent fibre, according to the species.

#### 1. *Dysidea fragilis*, Johnston.

Massive, sessile, simply convex or lobed. Consistence soft and resilient when fresh, firm when dry. Colour, when fresh, faint violet or whitish grey, sponge-yellow when dry. Surface conulated in much relief; conuli held together by a soft reticulated fibrous membrane. Pores in the interstices of the reticulation. Vents here and there, chiefly on the most prominent parts. Structure fibro-reticulated; interstices tympanized by the parenchymatous sarcode traversed by the

branches of the excretory canal-systems. Fibre arenaceous throughout. Size variable.

*Hab.* Marine.

*Loc.* British coasts generally.

*Obs.* The above description chiefly applies to the living or fresh state of the sponge, which, after the specimen has been torn off the rocks and the sarcode washed out by the waves, may be found on the beach in the *fragile* condition, and this probably led Johnston, who might not have seen it under other circumstances, to give it the above designation. When gathered from the rocks and dried directly it presents the conulated state above mentioned, which renders it, as before stated, very much like *Spongelia pallescens* under similar circumstances. Inserted for comparison.

For a short description of the variety in which the conuli are turned into round arenaceous balls, and for which I have proposed the name of "*Dysidea granulosa*," see 'Annals' of 1881 (vol. vii. p. 376).

## 2. *Dysidea Kirkii*, Bk.

Massive, sessile, more or less contracted towards the base, simple or lobate; lobes convex, manilliform, digital, sub-branched or indefinitely varied in their forms. Consistence firm, but easily broken, light. Colour grey externally, generally orange-yellow internally. Surface smooth and even or more or less rough, consisting of the dermal membrane, raised or not into small conuli by the projection of the subjacent arenaceous fibre. Pores in juxtaposition, uniformly continued over the dermal membrane, or interrupted in their continuity by the projections of the subdermal fibre. Vents numerous and large, situated on the prominent parts, at the ends of the manilliform lobes, or along the borders or ridges of the crested growths. Structure fibro-reticulate; fibre arenaceous, tympanized in its interstices by the parenchymal sarcode traversed by the branches of the excretory canal-systems. Size variable.

*Hab.* Marine.

*Loc.* Port Phillip Heads, South Australia. Depth variable.

*Obs.* When fresh this sponge, although firm, is easily broken, on account of the minimum of keratine which holds together the arenaceous material of the fibre. I have assumed that it is the species alluded to by Dr. Bowerbank, because out of a great number of specimens in Mr. Wilson's collection, as well as in the British Museum, I can find no other meriting the term "*Dysidea*," and Dr. Bowerbank does not appear to have gone beyond the description of its fibre,

while it is certain that it was among the Australian sponges which Mr. Kirk sent to him about the end of 1840 (Trans. Microscop. Soc. Lond. vol. i. p. 32).

### 3. *Dysidea hirciniformis*, n. sp.

Specimen a caulescent chaliniform bunch of solid stems, each about  $\frac{1}{2}$  in. in diameter, rising from a common contracted origin, dichotomously divided two or three times, and ending in pointed extremities. Consistence soft, delicate. Colour, when fresh, "pale buff, inclining to purple at the tips," now delicate flesh-colour generally. Surface conulated in strong relief. Pores between the conuli. Vents scattered here and there. Vertical and lateral fibre, all arenaceous. Size 5 in. long.

*Hab.* Marine.

*Loc.* Port Phillip Heads, South Australia. Depth 19 fath.

*Obs.* This species in its conulated surface resembles *Dysidea fragilis*, but is much coarser in general structure, especially in the flat spreading forms, where the dark rich flesh-colour of the sarcode is very striking, and recalls to mind the "rosy" tint of *Spongelia avara*, Sdt.

### 4. *Dysidea chaliniformis*, n. sp.

Caulescent, branched, stipitate; consisting of a compressed bunch of solid cylindrical stalks rising from a common stem; branches numerous, small and simple *below*, some not more than  $\frac{1}{8}$  in. in thickness, ending in a sharp point, which is sometimes bifurcated; increasing in size upwards, dividing and interuniting; the whole most irregularly. Consistence light, fragile, compressible. Colour reddish brown. Surface even, but minutely wrinkled from the sinking of the dermal pore-membrane upon the subjacent arenated fibre. Pores plentifully scattered throughout the dermal membrane. Vents also numerous, scattered over the flattened portions of the branches or in a line along them. Structure fibrous, fibre arenated throughout; texture fine. Size of specimen about 12 in. long by  $5 \times 1$  in. horizontally. Great diversity in the size of the branches, of which the largest and longest are  $\frac{3}{4}$  in. in diameter, while the smallest do not exceed  $\frac{1}{8}$  of an inch.

*Hab.* Marine.

*Loc.* Port Phillip Heads, South Australia. Depth 19 fath.

*Obs.* The caulescent character of this species, together with the solid, cylindrical, simple, and subdivided condition of the branches and the arrangement of their vents, would, at first sight, lead to the supposition that it was a specimen of

*Chalina polychotoma*, Esper, = *Chalina oculata*, Bk., such is the tendency, as before stated, of the sponge-sarcodæ throughout the class to produce the same kind of forms whatever the composition may be; so that here, although the form is like that of a caulescent *Chalina*, the characteristic toughness and resiliency of the latter, which arises from the presence of a large amount of keratine, is absent in *Dysidea chaliniformis*, where the opposite state renders it so brittle that, when wet, it is almost impossible to handle the specimen without a piece coming off, and in drying it breaks down under the slightest force.

There is another chaliniform specimen in the collection, but here the increased development of keratine, of which the lateral fibre is exclusively composed, not only lessens the amount of brittleness, but necessitates its being relegated to another genus, in which it will be found hereafter.

Let us pause here for a moment and revert to the "tabular view" which I have inserted at p. 215, in which it will be observed that the third and last family of the PSAMMONEMATA is termed "Pseudohircinida," of which it may be simply stated here that, not being intended for the genuine species of the order, its consideration may be postponed for a more convenient opportunity; meanwhile to proceed with our revision, I find it also desirable to suppress the fifteenth group in my original classification, viz. the Sarcocornea, and its present diagnosis *altogether*, and make it a genus in the sixteenth group, viz. the Arenosa, under the diagnosis just mentioned. Thus we should have three genera in the group "Arenosa;" but, inasmuch as further alterations will presently show that these sponges should have a distinct family name, I would propose for this the term "Arenida," when the whole would stand as follows:—

Family.	Group.	Genera.						
ARENIDA.....	<i>Arenosa</i> .....	<table border="0" style="display: inline-table; vertical-align: middle;"> <tr> <td style="font-size: 2em; vertical-align: middle;">{</td> <td style="padding-left: 0.5em;">1. <i>Holopsamma</i>.</td> </tr> <tr> <td></td> <td style="padding-left: 0.5em;">2. <i>Sarcocornea</i>.</td> </tr> <tr> <td></td> <td style="padding-left: 0.5em;">3. <i>Dysidea</i>.</td> </tr> </table>	{	1. <i>Holopsamma</i> .		2. <i>Sarcocornea</i> .		3. <i>Dysidea</i> .
{	1. <i>Holopsamma</i> .							
	2. <i>Sarcocornea</i> .							
	3. <i>Dysidea</i> .							

We now come to Psammonematous sponges in which *part of the fibre only* is cored or axiated with foreign material, the other part being clear, that is, composed of keratine only, the former belonging to the vertical and the latter to the lateral, which is merely an extension laterally of the vertical fibre in an exclusively keratose state, as it is almost exclu-

sively arenaceous in *Dysidea*. But, as this diagnosis alone applies more or less to all the remaining Psammonemata, it will be necessary to adopt a character if possible by which the genus *Spongelia* may be distinguished. Hence as the typical composition of the vertical or areniferous fibre in *Spongelia* consists of foreign objects enveloped in a layer of keratine which can hardly be seen with the naked eye, and in all the species above it for the most part this layer is the most predominant part of the fibre, it seems to me that this character, which I grant is only one of degree, is the most useful for the occasion that I can adopt.

I have already alluded in the introductory part of this communication to the general character of the fibre in *Spongelia*, as evidenced by Schulze's representation of a fragment of the skeleton of *S. pallescens* (*l. c.*), confirmed by a typical specimen of the same species which came direct from Schmidt, who established the genus; therefore I have only to extend Schmidt's original diagnosis to meet our present requirements, which will thus stand as follows:—

Gen. SPONGELIA, Nardo ap. Schmidt.

*Char. emend.* Form massive, simple or lobed, sessile or stipitate. Consistence soft and resilient when wet, firm when dry. Colour violet when fresh, sponge-colour when dry. Surface conulated in bold relief or entirely smooth. Pores restricted to the dermal membrane, tympanizing the intervals between the conuli or dispersed generally where there are none. Vents on the prominent or projecting parts. Internal structure loose, fibro-reticulate; vertical fibre arenaceous, lateral fibre chiefly keratose.

*Obs.* If this diagnosis be followed, then *Spongelia avara*, Sdt., according to Schulze's representation (*op. et loc. cit.* Taf. vi. fig. 4), and my own typical specimen, would not come under it, but under that of *Dysidea*. I have not had an opportunity of examining the other species of "*Spongelia*" mentioned by Schmidt; but a typical specimen of the preceding genus, viz. *Cacospongia cavernosa*, indicates from its hollow thin-walled fibre, together with other characters, that it is an *Aplysina* rather than a Psammonematous sponge.

There is only one specimen of *Spongelia* in Mr. Wilson's collection, which may be named and described as follows:—

*Spongelia stellidermata*, n. sp.

Specimen erect, thick, spatulate, compressed, stipitate, thinning from the centre towards the upper margin and sides, which



are irregularly serrated, thickening towards the stem, which is round and truncated (? cut off by the dredge). Consistence soft, resilient, in its wet state. Colour, when fresh, "reddish buff," now grey outside, reddish buff within. Surface covered with a densely poriferous cuticle, beneath which is a thick layer of intercrossing and interuniting curvilinear, soft, fleshy fibre without foreign bodies, which contains the subdermal cavities, and which, on the outside, presents a stelliform pattern, wherein the centres of the stellæ correspond to the ends of the fibre internally, which, however, do *not* come through the dermis. Pores numerous throughout the cuticle. Vents on the processes respectively which form the serration on the sides and upper margin. Internal structure fibroreticular, consisting of thick arenaceous vertical fibre, enveloped in an indistinct layer of keratine, interuniting by much lateral fibre, chiefly formed of keratine; the whole constituting a massive reticulation whose interstices are filled with pulpy parenchymatous sarcode of a bright orange-yellow colour, very much like that in *Holopsamma levis* &c. Size of specimen 4 in. high by 2 × 1 in. horizontally in its greatest dimensions.

*Hab.* Marine.

*Loc.* Port Phillip Heads, South Australia. Depth 3 fath.

*Obs.* When dried the surface becomes contracted, corrugated, and of a dark brown colour from the thickness of the dermal layer, in the midst of which whitish points may be seen, indicating the position of the ends of the arenaceous fibre beneath. The entire form and arrangement of the vents recalls to mind the skeletal specimens of *Psammonemata* in the British Museum &c., for which, from their fine and delicate structure, I have proposed the name "Callhistia." The species, described and photographed by Hyatt under the name of "*Spongelia incerta*" (*l. c.* p. 533, pl. xvi. fig. 32), which came from the same neighbourhood, viz. "Phillip Is.," is very much like the one I have noticed; and many of his other photographs under the same generic appellation, viz. fig. 13, pl. xv., and figs. 12, 13, 15, and 15 *a*, pl. xvii., from the same locality also, are very like the fine skeletal specimens in the British Museum, all of which are said to have come from Australia.

Although the chief distinguishing character for *Spongelia* which I have adopted places it *below* the remaining groups of *Psammonemata* in my original classification, it at the same time places it *above* all those in the family *Arenida* just mentioned, so that, belonging to neither, its *position* is thus indicated, while, to increase the facility of finding it, a family

name is required, which for the present, or provisionally, might be "SPONGELIDA," with "Spongelina" for the group, and "*Spongelia*" for the single genus, "with power to add to it," as they say. Thus:—

Family.	Group.	Genus.
SPONGELIDA .....	<i>Spongelina</i> .....	Spongelia.

The next group in my original classification above the Sarcocornea, now embodied in the Arenida (see pp. 215 and 218), is no. 14, the "Otahitica," so named from Ellis's representations of three "Otaheite" sponges in 1786 (Nat. Hist. Zoophytes, Ellis and Solander, tab. lix. figs. 1-3), afterwards called by Esper "*Spongia otahitica*," which term I adopted for a vast number of species and varieties of this kind unnamed and undescribed, but well sketched structurally and morphologically in my original diagnosis of the group. They are all strongly characterized by their papyraceous form, seldom exceeding  $\frac{1}{8}$  in. in thickness, and sometimes as thin as writing-paper itself; hence Hyatt's term "PHYLLOSPONGIADÆ" (Mem. Bost. Soc. Nat. Hist. 1877, p. 540) for the "family" is very appropriate and acceptable, for, from what I have just stated, the group will in all probability hereafter have to be subdivided, and then a family name must be supplied, so at once I would propose "PHYLLOSPONGIDA," Hyatt, merely altering the patronymic affix to suit my terminology.

Of this family there is only one specimen in Mr. Wilson's collection to show that it is represented on the south coast of Australia; but this is otherwise abundantly confirmed by several specimens from thence having passed through my hands, as well as by the three species described by Hyatt (*op. et loc. cit.* p. 543) under the generic name of "*Carteriospongia*." As, however, my object at present is, as before stated, chiefly to record, through Mr. Wilson's specimens, what is to be found on this coast for future identification, this specimen, which also appears to me to represent a new species, may be named and described as follows:—

*Carteriospongia caliciformis*, n. sp.

Specimen dry, thin, shallow, cup-like, with wide undulating brim, short thick stem, and small, erect, proliferous crest in the bottom. Consistence firm. Colour now light grey. Surface arenaceous, uniformly granulated. Pores on the outer

and vents on the inner side of the cup among the granulations. Wall almost entirely composed of short-jointed keratose fibre of a sponge-yellow colour, in which there is very little sand, and that chiefly towards the surface, while there is a great deal *outside* the fibre in the adjoining sarcode. Size of specimen 6 in. across the brim, 1 in. deep in the centre,  $\frac{1}{4}$  in. through the wall in the centre, diminishing towards the circumference.

*Hab.* Marine.

*Loc.* Port Phillip Heads, South Australia. Depth?

*Obs.* The pores being in the dermal incrustation outside, while the vents are immediately opposite, in the dermal incrustation of the cup inside, causes the wall, when the incrustations on both sides are washed off, to present a sieve-like structure.

[To be continued.]

XIX.—*Diagnoses of new Species of Cephalopoda collected during the Cruise of H.M.S. 'Challenger.'*—Part I. *The Octopoda.* By WILLIAM E. HOYLE, M.A. (Oxon), M.R.C.S., F.R.S.E., Naturalist to the 'Challenger' Commission.

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### OCTOPUS, Lamarck.

#### *Octopus verrucosus*, n. sp.

The *Body* is rounded, but so distorted by compression that no further details can be given. The *mantle-opening* extends fully halfway round the body, terminating a little below and behind the eye. The *siphon* is long, evenly conical, and pointed, and extends nearly halfway to the umbrella-margin.

The *Head* is short, not so broad as the body, and with *eyes* but slightly prominent.

The *Arms* are unequal in length, the second pair being considerably the longest, and almost six times as long as the body; they are comparatively stout and taper gradually. The *umbrella* extends about one fifth up the longest arms. The *suckers* are fairly close, deeply cupped and marked with radial grooves, between which are numerous very minute papillæ. About four suckers on each lateral arm opposite the umbrella-margin are larger than the others; beyond these they gradually diminish. The *hectocotylus* is present in both